AMENDMENTS TO THE DRAWINGS

Applicants have submitted more formalized drawings for all of the originally filed figures on seven replacement sheets attached hereto. The examiner is requested to accept the revised drawings for Fig. 1, Fig. 2, Fig. 3, Fig. 4, Fig. 5, Fig. 6, Fig. 7a, Fig. 7b, Fig. 8a, Fig. 8b, and Fig. 9. No modifications have been made to the content of the original drawings outside of formalization.

REMARKS

A. Status of the Application

Claims 1-14 are pending in the instant application. The Examiner rejected all 14 pending claims as being anticipated by U.S. Patent Application Publication No. 2002/0018264 ("Kodialam") under 35 U.S.C. § 102(e).

In response, the Applicants have canceled claims 1, 6, 7, 8 and 9. Claims 2, 10, 13 and 14 have been amended to clarify the claimed invention. Respectfully, the Applicant's submit that the amended claims are allowable over Kodialam.

B. Rejections based upon Kodialam

The Examiner has rejected all 14 pending claims as anticipated by Kodialam under 35 U.S.C. § 102(e). Applicants submit that the instant invention, as claimed in the amended independent claims 2, 10, 13 and 14, is clearly distinguishable from the systems and/or methods disclosed in Kodialam.

With respect to original claims 1-9, the Examiner noted that Kodialam teaches a method of determining a shortest path between a source node and a destination node in an optical network having plural network nodes interconnected with optical transmission links. Further, the Examiner pointed to Kodialam's representation of a network as a uni-directional graph (G = <V, E>), transforming the graph G to a wavelength graph (G' = <V', E'), and applying a single source algorithm to the G' graph in order to determine the shortest path corresponding to an optimal path on the G graph.

Regarding claims 2, 6, 10, 13 and 14, the Examiner characterized Kodialam as teaching the assignment of an electronic node each network node (wherein the electronic node represented an electronic switching fabric interconnecting optical-electrical-optical ("OEO") transmitters and receivers), assigning optical channel nodes to each network node (wherein each optical node represented an optical cross-connect for an optical channel), assigning an internal link from each electronic node to each optical node if (emphasis added) an associated OEO is available, assigning to each optical transmission link an

optical channel link between a pair of optical channel nodes of corresponding network nodes if (emphasis added) the corresponding optical channel is available is available on the associated optical transmission link, and assigning the costs to the internal links and the optical channel links. With respect to claims 13 and 14 in particular, the Examiner also noted that Kodialam paragraphs 0090-0091 made reference to computer program products and computer data signals.

The Examiner rejected dependent claims 3, 7 and 11 (related to assigning OEO conversion costs to internal links), and dependent claims 4, 8 and 12 (related to assigning optical transmission links costs to optical channel links) based upon Kodialam paragraph 0007 and 0008, respectively.

Finally, claim 5 was rejected by the Examiner citing Kodialam's teaching of applying Dijkstra's algorithm as a single-source shortest path algorithm.

In response, Applicants have canceled claims 1, 6, 7, 8 and 9. This leaves independent claims 2, 10, 13 and 14 still pending in the instant application.

Independent claim 2 has been amended so as to better capture the novel aspects of the present invention, wherein the process of determining the shortest path between a source and destination node includes the conditional assignment of internal links from an electronic node to an optical node only if an associated optical-electrical-optical ("OEO") transmitter is available, and the conditional assignment of internal links to an electronic node from an optical node only if an associated OEO receiver is available. Kodialam does not address the very real issue of connectivity within an optical network having a finite number of interconnecting OEO transmitters and associated nodes. In fact, Kodialam teaches away from a system that has such real world constraints. The embodiments disclosed by Kodialam, and the entire switching environment in which the Kodialam system operates allow for only two extreme conditions to exist within an optical switching network. As stated in Kodialam paragraph 0054:

> In accordance with IDR of the present invention, the representation of FIG. 3 may be employed to generate

> the routing algorithm to compute routes taking into account the capabilities of the different types of network elements. Each node of FIG. 1 is expanded into one or more sub-nodes, one sub-node per wavelength ($n_1\lambda_1$, $n_1\lambda_2$, $n_2\lambda_1$, $n_2\lambda_2$, $n_3\lambda_1$, $n_3\lambda_2$, $n_4\lambda_1$, and $n_4\lambda_2$). For the 2-wavelength example of WDM optical network **100** of FIG. 1, node **N3** (the node without wavelength conversion) is represented by two sub-nodes, and nodes **N1**, **N2**, and **N4** (the nodes capable of wavelength conversion) are represented by two sub-nodes and a super-node. For OXCs without wavelength conversion, each sub-node is connected to a wavelength on each incoming or outgoing link as shown in FIG. 2. For OXCs with wavelength conversion and for routers, the node also includes a super-node (**N11**, **N21**, and **N41**) coupled to the sub-nodes by infinite capacity links. Wavelength conversion occurs by traversing through this super-node from one sub-node at one wavelength to another sub-node at a different wavelength (e.g., from $n_2\lambda_1$ to $n_2\lambda_2$ through super-node **N21**).

The Kodialam model allows for only two simplistic and extreme node types to exist within the network: i) nodes without wavelength conversion, and ii) nodes with unlimited wavelength conversion abilities and capacities (the combination of sub-nodes connected to a super-node by infinite capacity links). Without getting into a discussion of enablement issues that the Kodialam super-node model may give rise to, the Kodialam reference exists within an environment where each node has complete and unlimited intra-node connectivity (see also, Kodialam FIG. 3). Although Kodialam makes reference to dealing with wavelength capacity issues (paragraph 0050), the method employed is merely switching from one wavelength to another when the original wavelength is unavailable. The super-node construct remains, and the intra-node connectivity is considered to remain intact and complete.

The Applicants submit that their invention, as claimed in amended claim 2, is readily distinguishable from Kodialam. Independent claim 1 now clearly states that:

> ... for each network node, assigning an internal link from the electronic node to each optical channel node

only if an associated OEO transmitter is available for the corresponding optical channel associated with a particular one of the available wavelengths λ_1 through λ_m, and assigning an internal link to the electronic node from each optical channel node *only if an associated OEO receiver is available for the corresponding optical channel associated with a particular one of the available wavelengths λ_1 through λ_m;*

and:

for each optical transmission link, assigning an optical channel link between a pair of optical channel nodes of corresponding network nodes *only if the corresponding optical channel is available on the associated optical transmission link*; ...

This amended claim language is fully supported by the originally filed specification (see paragraphs 0003 and 0008). As stated in paragraph 0003, "since there may not be a full OEO conversion capability at every node, traffic arriving at a node on one wavelength of a link may not be able to be relayed to another wavelength of a consecutive link". The Applicants' invention allows for traffic arriving on the first wavelength to be relayed to a third wavelength of the next consecutive link, even if the second wavelength on that next consecutive link is available. The reason being that the intra-node connection between the first and second wavelengths is not available. With the construct of the super-node, and the extreme-case node modeling, Kodialam's fails to allow for this case. Again, the language in paragraph 0008 of the Applicant's originally filed specification clearly describes how to conditionally connect each optical channel node to the electronic node, based on OEO transmitter/receiver availability.

Consequently, the Applicants believe independent amended claim 2, as well as amended claims 3, 4 and 5 (depending there from), to be allowable over the Kodialam reference.

The remaining pending independent claims, 10 and 13 and 14, have been amended to include the same limitations as presently amended claim 2. Consequently, the arguments set forth above are believed to be equally applicable to these other presently amended independent claims (as well a dependent claim 11 and 12). The Examiner's reconsideration is respectfully requested.

CONCLUSION

Applicants respectfully request that the Examiner consider the analysis of the reference offered above. It is believed that in light of the information provided by the Applicants, pending claims (2—5 and 10-14) are in condition for allowance, and, accordingly, the Examiner is requested to pass this application to issue.

Please charge any fees associated herewith, including extension of time fees, to **50-2117.**

Respectfully submitted,
Zhang, Hongbiao, et al.

SEND CORRESPONDENCE TO:

Motorola, Inc.
Law Department

Customer Number: **22917**

By: Lalita W Pace

Lalita W. Pace
Attorney for Applicant
Registration No.: 39,427
Telephone: 847-538-5855
Fax: 847-576-3750